Notornis, 2008, Vol. 55: 191-206

ƔƔlƝıƘƘƛƔ ɘ 3 Ï Ì . ÙÕÐÛ Ï ÖÓÖÎÐÊÈÓ 2ÖÊÐÌÛà ÖÍ - Ì Þ 9 ÌÈÓÈÕÈÓ (ÕÊ

The New Zealand storm-petrel (*Pealeornis maoriana* Mathews, 1932): ýrst live capture and species assessment of an enigmatic seabird

! 1 $ - 3 , 23 $ / ' $ - 2 . -
$ÊÖı 5ÐÚÛÈó / ÏÖÛÖÎÙÈ× Ï à ö 1 ÌÚÌÈÙÊ Ï Ó / . ! Öß ƜlƝhÓ ' ÈÝÌÓÖÊÒ - ÖÙÛ Ï ƘhƙƛÓ - Ì Þ 9 ÌÈÓÈÕÈ

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/ÛÌÙÖÈÙÖÔÈ / ÌÓÈÎÐÊÚ - 9Ó / . ! Öß ƚƜƚÓ 6 ÈÙÒ Þ ÖÙÛ Ï Ó - Ì Þ 9 ÌÈÓÈÕÈ

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Ì×ÈÙÛÔ ÌÕÛ ÖÍ " ÖÕÚÌÙÝÈÛÐÖÕÓ / ÖÙÛ%Ð ɥ ÙÖà , ÈÐÓ " ÌÕÛÙÌÓ & ÙÌÈÛ ! ÈÙÙÐÌÙ (ÚÓÈÕÈÓ - Ì Þ 9 ÌÈÓÈÕÈ

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Abstract 3 Ï Ì - Ì Þ 9 ÌÈÓÈÕÈ ÚÛÖÙÔ ı×ÌÛÙÌÓ *Pealeornis maoriana* , ÈÛÏ Ì Þ ÚÓhƝƚ l Þ ÈÚ ÈÌÚÊÙÐÉÌÈ ÍÙÖÔ ƚÚ×ÌÊÐÔ ÌÕÚ ÊÖÓÓÌÊÛÌÈ in the 19th ÊÌÕÛÜÙà 2ÐÕÊÌ hƝƙl ÐÛ ÏÈÚ ÔÖÚÛ ÊÖÔ ÔÖÕÓà ÉÌÌÕ ÊÖÕÚÐÈÌÙÌÈ ÈÚÜÉÚ×ÌÊÐÌÚ ÖÍ 6 ÐÓÚÖÕ ƶÚ ÚÛÖÙÔ ı×ÌÛÙÌÓ *Oceanites oceanicus* ÌßÏÐÉÐÛÐÕÎ Û Ï Ì ÝÌÕÛÙÈÓÓà ÚÛÙÌÈÒÌÈ ?*Pealea*ɔ ×Ï ÌÕÖÔ ÌÕÖÕ 3 Ï ÌÙÌ ÏÈÉ ÉÌÌÕ ÕÖ ÙÌÊÖÙÈÌÈ ÚÐÎ ÏÛÐÕÎÚ ÖÍ Û Ï Ì - Ì Þ 9 ÌÈÓÈÕÈ ÚÛÖÙÔ ı×ÌÛÙÌÓ ÐÕ ÖÝÌÙ hƝƛ à ÌÈÙÚ ÉÌÍÓÙÌ)ÈÕ lƔƔƚ 2ÐÕÊÌ Û Ï ÌÕÓ ÖÉÚÌÙÝÈÛÐÖÕÚ Ö ř ÕÖÙÛ Ï ÌÙÕ - Ì Þ 9 ÌÈÓÈÕÈ ÖÍ ÚÛÖÙÔ ×ÌÛÙÌÓÚ ÉÌÓÐÌÝÌÈ ÛÖ ÉÌ Û ÛÏÐÚ ÛÈßÖÕ ÏÈÝÌ ÉÌÌÕ ÔÈÈÌ ÙÌÎÜÓÈÙÓà ÉÜÙÐÕÎ Û Ï Ì ÈÜÚÛÙÈÓ ÚÜÔÔÌÙ %ÙÖÔ ÖÉÚÌÙÝÈÛÐÖÕÚ ÈÕÈ ×ÏÖÛÖÎÙÈ×ÏÚÓ Û Ï ÌÚÌ ÉÐÙÈÚ È××ÌÈÙÌÈ ÔÖÙÌ ÚÐÔÐÓÈÙ ÛÖ Û Ï Ì - Ì Þ 9 ÌÈÓÈÕÈ ÚÛÖÙÔ ı×ÌÛÙÌÓ Û ÏÈÕ ÛÖ ÖÛ Ï ÌÙ ÚÛÖÙÔ ×ÌÛÙÌÓ Ú×ÌÊÐÌÚ ÖÊÊÜÙÙÐÕÎ ÐÕ Û Ï Ì ÙÌ ÎÐÖÕ ' Ö Þ ÌÝÌÙÓ ÊÖÕ ɼÛÔÈÛÐÖÕ ÖÍ Û Ï ÌÐÙ ÐÈÌÕÛÐÛà Þ ÈÚ ÖÖÛ ×ÖÚÚÐÉÓÌ Þ ÐÛ Ï ÖÜÛ ÊÈ×ÛÜÙÌ (Õ - ÖÝ lƔƔƙ ÖÕÌ Þ ÈÚ ÊÈ×ÛÜÙÌÈ Ö ř +ÐƔÓÌ ! ÈÙÙÐÌÙ (ÚÓ ÈÕÈ Ɨ ÔÖÙÌ Þ ÌÙÌ ÊÈÙÎ Ï Û ÌÓÚÌ Þ Ï ÌÙÌ ÐÕ Û Ï Ì ' ÈÜÙÈÒÐ & ÜÓÍ ÐÕ)ÈÕ lƔƔƚ ÕÈÓà ÚÌÚ ÖÍ ÈÌÙÈÐÓÌÈ ÈÌÚÊÙÐ×ÛÐÖÕÚÓ ×ÏÖÛÖÎÙÈ×ÏÚÓ ÈÕÈ ÔÖÙ×ÏÖÔ ÌÛÙÐÊ ÈÈÛÈ ÖÍ Û Ï ÌÚÌ ÉÐÙÈÚ ×ÙÖÝÐÈÌ ÊÖÕÊÓÜÚÐÝÌ ÌÝÐÈÌÕÊÌ Û Ï ÈÚ Û Ï Ì à ÙÌ×ÙÌÚÌÕÛ ÈÕ ÌßÛÈÕÛ ×Ö×ÜÓÈÛÐÖÕ ÖÍ Û Ï Ì - Ì Þ 9 ÌÈÓÈÕÈ ÚÛÖÙÔ ı×ÌÛÙÌÓ . ÜÙ ÈÕÈÓà ÚÌÚ ÖÍ Û Ï ÌÚÌ ÈÈÛÈ ÈÕÈ ÊÖÔ ×ÈÙÐÚÖÕ Þ ÐÛ Ï Û Ï Ì - Ì Þ 9 ÌÈÓÈÕÈ ÚÛÖÙÔ ı×ÌÛÙÌÓ ÔÜÚÌÜÔ Ú×ÌÊÐÔ ÌÕÚ ÈÕÈ hƝƛ ÖÛ Ï ÌÙ 2ÖÜÛ Ï ÌÙÕ ' ÌÔÐÚ×Ï ÌÙÌ ÚÛÖÙÔ ×ÌÛÙÌÓ ÛÈßÈ ɥÚÜÉÍÈÔÐÓà . ÊÌÈÕÐÛÐÕÈÌ ÁÓÌÈÈ ÚÚ to conclude that this species is distinct.

2ÛÌ×Ï ÌÕÚÖÕÓ ! ó , ó & ÈÚÒÐÕ " ó / ó & ÙÐ Ś Û Ï ÚÓ 1 ó ÓÒ ÌÚÖÕÓ ' ó ! ÈÐÙÈÓ * ó ó / ÈÓÔÈÓ 1 ó + ó (ÔÉÌÙÓ , ó) lƔƔƜ 3 Ï Ì - Ì Þ 9 ÌÈÓÈÕÈ ÚÛÖÙÔ ı×ÌÛÙÌÓ ɥ *Pealeornis maoriana* , ÈÛÏ Ì Þ ÚÓhƝƚ lÁó ɼÙÚÛ ÓÐÝÌ ÊÈ×ÛÜÙÌ ÈÕÈ Ú×ÌÊÐÌÚ ÈÚÚÌÚÚÔ ÌÕÛ ÖÍ ÈÕ ÌÕÐÎÔÈÛÐÊ ÚÌÈÉÐÙÈ ó *Notornis 55 (4)*: hƝƝı lƔƚ ó

Key Words ÙÌÈÐÚÊÖÝÌÙà ÓÌßÛÐÕÊÛÓ ÚÌÈÉÐÙÈÓ *Pealea* Ó %ÙÌÎÌÙÈÓ *Oceanites*

INTRODUCTION

In Jan 2003 a small black-and-white storm petrel ÞÈÚ ×ÏÖÛÖÎÙÈ×Ï ÌÈ Ö ř 6 ÏÐÛÐÈÕÎÈÓ " ÖÙÖÔÈÕÈÌÓ / ÌÕÐÕÚÜÓÈÓ - Ì Þ 9 ÌÈÓÈÕÈ ɥƚ ƚŞƙƚƶƙƙɔ 2Ó hƝƛ ƚŞƔhƶƙƜɔ $Ą ɥ 2ÈÝÐÓÓÌ *et al* lƔƔƚÓ 2ÛÌ×Ï ÌÕÚÖÕ *et al* lƔƔƜÁó (Õ - ÖÝ 2003 at least 10 similarly-plumaged storm petrels ÞÌÙÌ ÚÌÌÕ l ÕÔ ÕÖÙÛ Ï ÖÍ +ÐƔÓÌ ! ÈÙÙÐÌÙ (ÚÓ ' ÈÜÙÈÒÐ & ÜÓÍÓ - Ì Þ 9 ÌÈÓÈÕÈ ɥ %ÓÖÖÈ lƔƔƚÓ 2ÛÌ×Ï ÌÕÚÖÕ *et al.* lƔƔƜÁó 2ÜÉÚÌØÜÌÕÛÓà ÛÏ ÌÙÌ ÏÈÝÌ ÉÌÌÕ hƔƔÚÓÍÚÐÎ ÏÛÐÕÎÚ ÖÍ Û Ï ÌÚÌ ÚÛÖÙÔ ×ÌÛÙÌÓÚ ÐÕ Û Ï Ì ' ÈÜÙÈÒÐ & ÜÓÍ ɥ & ÉÚÒÐÕ ö ! ÈÐÙÈ lƔƔƙÓ *authors unpubl.*). It has been widely considered that these birds indicated the continued ÌßÐÚÛÌÕÊÌ ÖÍ Û Ï Ì - Ì Þ 9 ÌÈÓÈÕÈ ÚÛÖÙÔ ı×ÌÛÙÌÓ *Pealeornis maoriana* ɥ 2ÈÝÐÓÓÌ *et al* lƔƔƚÓ %ÓÖÖÈ lƔƔƚÓ ! ÙÖÖÒÌ lƔƔƙÓ ! ÐÙÈÓÐÍÌ (ÕÛÌÙÕÈÛÐÖÕÈÓ lƔƔƚÁÓ ÈÕ ÌÕÐÎÔÈÛÐÊ ÛÈßÖÕ ÕÖÛ ÈÊÊÌ×ÛÌÈ Éà ÙÌÝÐÌ Þ ÚÓ ÖÍ Û Ï Ì ÖÙÈÌÙ / ÙÖÊÌÓÓÈÙÐÍÖÙÔ ÌÚ

Received 7 Jan 2009; accepted 5 Jun 2009
" ÖÙÙÌÚ×ÖÕÈÐÕÎ ÈÜÛÏÖÙ ! ÙÌÕÛ , ó 2ÛÌ×Ï ÌÕÚÖÕ
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in the late 20th [illegible]

[illegible] petrels [illegible] *et al.* [illegible] *Oceanites gracilis* and white-throated storm-petrels [illegible] *fuliginosa* were discounted due to size and plumage [illegible] *et al.* [illegible] the Jan 2003 bird was an aberrantly-plumaged white-bellied [illegible] *O. oceanicus* [illegible] *et al.* 2003) because *Garrodia* [illegible] *Pelagodroma* [illegible] and *Oceanites* [illegible] similarly-plumaged storm-petrels discounted this possibility.

[illegible] largely due to the existence of only 3 specimens and [illegible] *et al.* [illegible]

[illegible] storm petrel was obtained and named *Thalassidroma lineata* [illegible] both to *Oceanites lineata* due to similarities he felt they shared with *Oceanites* [illegible] *Pealea* [illegible] *P. lineata*).

[illegible] with a colour illustration of 1 of the Paris specimens [illegible] Paris specimen). Godman retained *Pealea lineata* and [illegible]

[illegible] large numbers of *F. grallaria* [illegible] concluded to show features intermediate between *F. grallaria* and *F. tropica*. [illegible] *lineata* [illegible]

[illegible] *F. lineata* [illegible]

[illegible] new genus and species *Pealeornis maoriana* [illegible]

[illegible] phase of *O. oceanicus* [illegible] was *F. tropica* [illegible] *F. grallaria* [illegible] *F. grallaria* [illegible] *N. fuliginosa* [illegible] *Garrodia nereis* [illegible] *Pelagodroma marina* [illegible] ?*Pealea*? phenomenon [illegible]

[illegible] *Oceanites maorianus* [illegible] *O. oceanicus* was thought only to straggle [illegible]

et al. [illegible] *O. oceanicus* [illegible] suggested the 3 specimens were a form of *F. tropica*) [illegible] *et al.* [illegible] *O. maorianus* [illegible] *Pealeornis maoriana.*

[illegible]

METHODS

[illegible] taken from the breast for molecular analysis.

[illegible] each day.

[illegible] mid-toe and claw length) with Vernier callipers to [illegible] measured using a stop rule to the nearest 1 mm. [illegible]

[illegible] birds were compared with measurements from [illegible] *O. oceanicus*, *O. gracilis*, *F. tropica*, *F. grallaria*, *N. fuliginosa*, *G. nereis*, and *Pelagodroma marina*. [illegible]

[illegible]

RESULTS

Comparison of captured birds with NZSP museum specimens and other extant storm petrels

[illegible] the measurements from the captured birds with [illegible] It also indicates that most of the taxa with which [illegible] specimens.

[illegible] the analysis also found that *F. g. segethi* and both *O. o. oceanicus*, and *O. o. exasperatus* [illegible] *F. g. segethi*

Table 1.œ , ÖÙ×ÏÖÔÔÌÛÙÞÊÚœÈÒÕËœÔÈÚÚœpœ2#ÆœÖÍœÛÎÏÌœKœÊÈ×ÚÜÙÌËœÚÚÖÙÔœ×ÌÛÙÌÓÚœÊÖÔ×ÈÙÌËœÞÞÛÏœÛÎÏÌœŁœ - 92/œÔÜÚÌÜÔœÚ×ÌÊÞÔÌÒÛÚœÈÒËœhwÆœÖÛÎ ÌÙœÌßÚÈÒÙœÚÙÖÙÔœ×ÌÛÙÌÓÚœÛÈßÈœpÚÜÉÍÈÔÞÓàœ . ÊÌÈÒÞÙÞÔÈÌÆœ%ÖÙœÚÚÜËÞÌÚœÞ ÏÌÙÌœÚÛÈÒËÈÙËœËÌÝÞÈÙÞÖÔœÞÙÙœÕÖÙœÎÞÝÌÒÙœÙÈÒÎÎÌœÞÙœ×ÙÍÚÌÕÙÌËœ 6 ÏÌÙÌœÚÈÔ×ÔÌœÚÞáÌœÝÈÙÞÌËœÉÌÙÞÌÌÔœÔÌÈÚÜÙÌÚœÛÏÌœÙÈÒÎÌœÞÔÓÍœÚÈÔ×ÔÌœÚÞáÌœÞÚœÎÞÝÌÒõ

# ÈÙÈœ set	3ÈßÈ	n	2Ìß	wing φÔÔÆ	tail φÔÔÆ	bill length φÔÔÆ	tarsus φÔÔÆ	mid-toe + ÊÓÈÞœpÔÔÆ	mid-toe + claw/tarsus	mass φÎÔÆ
hɪÞK	"È×ÛÜÙÌËœÉÞÙËÚ	K	4ÕÒ	hʊKŒßƛœpœŁßƛ	ŁŁõŸœpœhõk	hʊŁßKœpœŸõŁ	ŁkõNœpœŸõN	lNõKœpœhwõl	Ÿõ€ŒlœpœŸõhʊ	ŁŁõlœpœlõk
kɪƛ	- 92/œÔÜÚÌÜÔœÚ×ÌÊÞÔÌÒÕÚœ[1]	3	4ÕÒ	hʊKŒßŒœpœlõK	kJNõŁœpœKõŸ	hʊlõŁœpœŸõhʊ	ŁkõhʊœpœŸõl	lƛõŁœpœŸõl	Ÿõƛ€œpœŸõŸŸK	-
	- 92/œÔÜÚÌÜÔœÚ×ÌÊÞÔÌÒÕÚœ[2]	3	4ÕÒ	hʊKŒßŸœpœŸõŸ	ŁKõƛœpœŁõl	12.2 ± 0.3	ŁŁõŸœpœhwõŸ	lƛõlœpœŸõŁ	ŸõƛkœpœŸõŸhʊ	-
Kk	*O. oceanicus oceanicus*œ2Û Ïœ&ÌÖÙÎÞÈÙœÓÞÝÌœ birds [1]	12	4ÕÒ	hʊKŁõŁ φhʊKŸõŸɪhʊKŒßŸƛ	Ł lõk φkJNõŁɪɪŁŒßŸƛ	hʊlõk φhʊhwßŒɪhʊŁõŸƛ	ŁKõƛ φŁŁõhʊɪŁŁõŸƛ	lƛõk φlŁõŸɪlŒßƛƛ	Ÿõƛ N	-
Œ	*O. oceanicus oceanicus* 2Û Ïœ&ÌÖÙÎÞÈÙœÓÞÝÌœ	hʊKɪll	ä	hʊkKõŸœpœŁõl	-	hʊlõŁœpœŸõŁ	ŁkõKœpœhwõhʊ	-	-	ŁŁõlœpœlõƛ
9	breeders [3]	hʊKɪhvŒ	ä	hʊkŸõŒœpœŁõŸ	-	12.3 ± 0.3	ŁKõlœpœŸõJN	-	-	ŁŁõŁœpœhwõJN
10	*O. oceanicus oceanicus* (ÓÌÚœ* ÌÙÎÜÌÓÌÕÚœ ÓÞÝÌœÉÞÙËÚœ[K]	hʊK	4ÕÒ	hʊKlõƛœpœkõl	-	hʊlõKœpœhwõhʊ	ŁkõKœpœhwõk	-	-	ŁKõlœpœƛõŸ
11	*O. oceanicus oceanicus* (ÓÌÚœ" ÙÖáÌÚÚœÓÞÝÌœ birds [k]	29-31	4ÕÒ	hʊKŁõŸœpœKõŸ	-	hʊlõhwœpœŸõK	ŁKõŒœpœhwõhʊ	-	-	32.0 ± 3.0
12	*O. oceanicus* ÛÓÈÕÚÞÊœÚÒÞÕÚœÐÕÉÓÜËÞÕÎœ ÑÜŸÌÔÞÓÌÚœ[1]	JNƛ	4ÕÒ	hʊKKõJN φhʊŁŁõŸɪhʊKkõkƛ	ŁŁõƛ φkŁõKɪɪƛŁõŸƛ	hʊlõŁ φhʊhwõhʊɪhʊŁõlƛ	ŁKõŁ φŁhʊõŁɪŁŁõŒƛ	lƛõk φlŁkõŁɪŁŸõŸƛ	Ÿõƛ N	-
13	*O. oceanicus exasperatus* ÕÚÈÙÈÚÞÊœ	hʊŁɪhʊK	ä	hʊkKõŁœpœŁ	ƛŸõNœpœlõŒ	hʊlõlœpœŸõk	ŁKõKœpœŸõƛ	lJNõKœpœhwõŸ	Ÿõ€Œk	-
hʊK	continent skins [k]	21	ä	hʊkhwõŒœpœKõŒ	ŁJNõŸœpœŁõK	hʊlõlœpœŸõk	ŁŁõŁœpœhwõl	lŒßŸœpœhwõhʊ	Ÿõ€ŒŁ	-
hʊk	*O. oceanicus exasperatus* 2ÞÎÕàœ(ÚœÖÜÙÌœ . ÙÒÕÌàœ(ÚÚœÓÞÝÌœÉÞÙËÚœ[ll]	ŁJNɪŁKK	4ÕÒ	hʊkhwõKœpœŁõJN	ŁJNõŁœpœlõŁ	hʊlõŁœpœŸõƛ	ŁKõlœpœhwõhʊ	lJNõŁœpœhwõŸ	Ÿõ€Œƛ	ŁƛõKkœpœŸõŁœ ɪKŁõŁJNœpœŸõŁ
hʊŁ	*O. gracilis gracilis* [9]	23	ä	hʊlŒßl	kŁõŁ	11.1	lJNõk	-	-	-
hʊƛ		23	ä	hʊlŁõŒ	kkõK	11.1	30.2	-	-	-
hvŒ	*O. gracilis galapagoensis* [9]	hʊK	4ÕÒ	hʊŁkõŁ	kƛõŸ	11.2	ŁŸõƛ	-	-	-
-	*O. g. galapagoensis*œpÚÞÕÎÔÌœÓÞÝÌœÍÌÎÔÈÓÌÆœ[10]		-	-	-	-	-	-	-	hʊƛõŸ
19	*F. tropica* ÕÚÞ×ÖËÌÚœÈÒËœ!ÖÜÕÛàœ(ÚÚœ skins [1]	Ł	ä	hʊŁŁõŁ φhʊKŒßkɪhʊŁƛõŸƛ	ƛKõŸ φƛlõŸɪƛŁõŸƛ	hʊkõhʊ φhʊKõKɪhʊkõƛƛ	Klõ€Œ φKlõŸɪKŁõkƛ	l€ßŒ φlƛõkɪlJNõŁƛ	ŸõŁƛ	-
20		20	ä	hʊŁŸõŸ φhʊKKõŸɪhʊŁƛõŸƛ	ƛŁ†õN φƛlõŸɪƛƛõŸƛ	hʊkõhʊ φhʊKõŸɪhʊkõŒƛ	Khwõhʊ φKVõŸɪKhwõŒƛ	l€Œl φlƛõkɪlJNõŸƛ	Ÿõ†N	-
21	*F. tropica*œ2ÞÎÕàœ(ÚœÖÜÙÌœ . ÙÒÕÌàœ(ÚÚœÓÞÝÌœ	hʊkɪhʊŁ	ä	hʊƛŸõŒœpœkõk	ƛJNõKœpœŁõk	hʊkõhwœpœŸõƛ	KŸõŒœpœhwõl	lJNõŁœpœhwõK	Ÿõƛl	kŁõkœpœŁõŁ
22	birds [11]	10	ä	hʊŁlõŁœpœkõŸ	ƛƛõŁœpœKõŸ	hʊkõŁœpœŸõk	ŁJNõŁœpœŸõŒ	29.5 ± 0.1	Ÿõƛ K	kŁõŸœpœkõK
23	*F. tropica*œ2ÖÜÙÌœ2ÏÌÚÓÈÒËœ(ÚÚœÚÞÕÚœ[11]	Ł	ä	hʊŁƛõkœpœŁõŸ	ƛƛõŸœpœŁõhʊ	hʊkõhwœpœŸõŁ	ŁJNõŁœpœŸõƛ	lJNõhwœpœŸõŒ	Ÿõƛ K	-
lK		9	ä	hʊŁŁõKœpœKõK	ƛKõKœpœhwõJN	hʊkõŁœpœŸõŁ	ŁJNõŁœpœŸõƛ	lJNõkœpœhwõŸ	Ÿõƛk	-

Table 1. " ÖÕÛÐÕÜÌËõ

lk	*F. tropica* ÕÛÐ×ÖËÌÚÙóÐÝÌÉÐÙËÚ[12]	10	4ÕÒõ	ÙÞŁKõŁÞÙÙÙlõÝ	ƛKõŁÞÙŁõk	ÙÞKõlÞÙÝõN	KÙõŁÞÙKõÕK	30.2 ± 3.2	ÝõƛŁ	kŁõNÞÙÙlõÝ
lŁ	*F. tropica* (ÒÌÚ " ÙÖáÌÚÙóÐÝÌÉÐÙËÚ[K]	ŁWıfkK	4ÕÒõ	ÙÞŁŁõÝÞÙKõÝ	-	ÙÞKõKÞÙÝõŁ	KÝõNÙÞÙÙõK	-	-	klõÝÞÙŁõÝ
lƛ	*F. tropica*(ÒÌÚ * ÌÙÎÜÌÒÌÕÚóÐÝÌÉÐÙËÚ[K]	13	4ÕÒõ	ÙƛÙõKÞÙŁõN	-	ÙÞKõWÞÙÙõl	KlõKÞÙÙõW	-	-	kKõKÞÙŁõÙ
lW	*F. g. grallaria*+ÖÜËÞ ' ÖÞÌÞ(ÙÚÒÐÝÌÉÐÙËÚÙ wing not straightened [13]	ŁkıŁƛ	4ÕÒõ	ÙŁWõÝÞÙŁõW	ƛKõŁÞÙŁõŁ	ÙÞKõÙÞÙÝõK	ŁƛõÙÞÙÙõÝ	-	-	klõÝÞÙKõƛ
29	*F. g. grallaria*+ÖÜËÞ ' ÖÞÌÞ(ÙÚÒÐÕÚ[hK]	W	4ÕÒõ	ÙŁKõÝÞÙŁõÝ	ƛKõÝÞÙlõk	ÙÞKõÝÞÙÝõk	ŁƛõŁÞÙÙõŁ	lÙõŁÞÙÙõÙ	Ýõkƛ	-
30	*F. g. titan*1È×È(ÙÚÒÐÕÚÙÙÈÒÎÌÙÍÖÙÔÈÒÌ and female [hK]	10	ä	ÙWKõÙ	WŁõW	ÙÞkõk	KÙõŁ	lkõW	ÝõŁl	-
31		ÙƛÙWõÝ	ä	ÙWõÝ	WlõK	ÙÞkõK	KÝõŁ	lkõÙ	ÝõŁl	-
		ϕÙƛƛıÙWWA		ϕƛWõÝıWJNõÝA	ϕŁJNõÝıKŁõÝA	ϕlŁõŁılƛõÝA				
32	*F. g. segethi*Þ , ÈÚÞ ÛÐÌÙÙÈÚ)ÜÈÕ	12	ä	ÙkŁõK	ƛŁõk	ÙŁõK	ŁkõŁ	lÙõk	Ýõ Ł Ý	-
33	%ÌÙÒÈÕËÌá(ÚÙÙÈÒÎÌÍÒÙÞËÖÛÎÞÔÈÓÌÈÕËÞ female [1]	kÙ	ä	ÙkKõK	ƛŁõŁ	13.1	ŁkõÝ	lÙõŁ	Ýõ Ł l	-
		ϕÙKŁõÝıÙŁŁõÝA		ϕƛÙõÝıƛƛõÝA	ϕÙlõŁıÙKõÝA	ϕŁÝõÝıŁlõŁA				
ŁK	*F. g. leucogaster*3ÙÐÚÛÈÒÞËÈÞ " ÜÕÌÈÓÞÓÝÌÞ birds [hŁ]	lKıŁÝ	4ÕÒõ	ÙŁWõÝÞÙŁõW	ƛWõŁÞÙŁõW	ÙÞkõWÞÙÝõŁ	KÝõƛÞÙlõƛ	lŁõÙÞÙlõƛ	Ýõ Ł K	klõŁÞÙKõƛ
Łk	- ÌÚÖÛÌÎÌÙÈÞÚÐÎÐÕÕÚÈ Line Group and , ÈÙØÜÌÚËÚÞ(ÚÙÚÓÐÕÚ[hA]	k	ä	ÙWŁõl	ϽKõÙ	ÙŁõl	KlõÝ	ŁÝõŁ	Ýõ Ł	-
ŁŁ		ÙWŁõÝ	ä	ÙWõÝ	ϽNŁõÝ	ÙƛõŁ	KÙõŁ	ŁÝõŁ	Ýõ Ł K	-
		ϕÙƛϽNõÝıÙϽNKõÝA		ϕϽNKõÝıÙÝõÝA	ϕÙŁõŁıÙWõÝA	ϕlϽNõÝıŁKõÝA				
Łƛ	*G. nereis*Þ(ÒÌÚ * ÌÙÎÜÌÒÌÕÚóÐÝÌÞÉÐÙËÚ[K]	ŁWıfKÙ	4ÕÒõ	ÙlŁõWÞÙŁõW	-	13.1 ± 0.9	31.9 ± 1.3	-	-	ŁWõlÞÙŁõõK
ŁW	*G. nereis*Þ(ÒÌÚ " ÙÖáÌÚÙóÐÝÌÞÉÐÙËÚ[k]	ÙŁıÙW	4ÕÒõ	ÙlƛõÝÞÙŁõÝ	-	ÙŁõŁÞÙÙõK	ŁlõŁÞÙÙõK	-	-	ŁlõÝÞÙKõÝ
39	*G. nereis*Þ " ÏÈÙÎÜÈÔÞ(ÙóÐÝÌÞÉÐÙËÚ[hW]	ÙÙıÙŁ	ä	ÙŁKõNÞÙŁõÙ	ŁŁõÝÞÙlõK	13.0 ± 0.3	32.3 ± 0.9	-	-	ŁKõÝÞÙlõN
KÝ		13-19	ä	ÙlJNõkÞÙlõk	ŁŁõKÞÙÙõN	ÙlõƛÞÙÝõK	ŁÙõWÞÙÙõÙ	-	-	ŁKõÝÞÙlõN
Khu	*G. nereis*Þ - ÌÞÞ9ÌÈÓÈÒËÞÚÜÜÉı ÕÛÈÙÊÛÐÊÞ (ÚÙÚÒÐÕÚ[hK]	lKılƛ	ä	ÙŁŁõlÞÙŁõƛ	ŁƛõÝÞÙŁõÝ	ÙlõNÞÙÝõK	ŁŁõKÞÙÙõK	-	-	-
Kl		ÙŁlƛÙ	ä	ÙlƛõKÞÙŁõŁ	ŁlõNÞÙlõÙ	ÙŁõÝÞÙÝõk	ŁÙõƛÞÙÙõk	-	-	-
Kƛ	*Pelagodroma marina marina*3ÙÐÚÛÈÒÞËÈÞ " ÜÕÌÈÞÙÒÐÕÚ[19]	1	ä	ÙŁŁ	WÝõk	ÙŁõƛ	KÙõÙ	ŁkõW	ÝõWƛ	-
KW		1 ?	ä	ÙkJN	WÝõl	ÙkõÝ	KlõÙ	33.1	ÝõƛN	-
KŁ	*Pelagodroma marina maoriana*Þ - ÌÞÞ 9ÌÈÙÈÕËÞÙÌÎÐÖÖÙÞÚÐÕÚ[19]	21	ä	ÙkWõÝ	ƛŁõƛ	Ùkõƛ	KÝõW	ŁkõÙ	ŁWŁ	-
		ϕÙKJNõÝıÙŁJNõÝA		ϕŁƛõƛıWŁõƛA	ϕÙKõŁıÙŁõƛA	ϕŁƛõWıKlõÝA	ϕŁlõÝıŁƛõkA			
KK		ÙkƛõŁ	ä	ÙkƛõŁ	ƛKõW	ÙkõW	KÝõW	ŁkõÝ	ŁWŁ	-
		ϕÙkÝõÝıÙŁKõÝA		ϕŁWõNıWKõƛA	ϕÙKõNıÙŁõKA	ϕŁWõKıKlõKA	ϕŁlõŁıKÝõNA			
KŁ	*Pelagodroma marina maoriana* , ÖÖÖÏÞÕÈÜ(ÚÞ - ÌÞÞ9ÌÈÓÈÒËÚÞÐÝÌÞÉÐÙËÚ[20]	9	4ÕÒõ	ÙkWõŁÞÙKõÙ	-	ÙŁõƛÞÙÝõƛ	-	-	-	KŁõNÞÙKõÙ

Table 1. Continued.

49	*Pelagodroma marina dulciae* Australia, skins[19]	13	ä	157.5 (151.0-167.0)	74.0 (70.5-77.6)	16.8 (15.2-17.3)	42.2 (40.8-44.0)	36.0 (34.0-37.3)	0.85	-
50		19	ä	159.2 (152.0-168.0)	73.8 (69.0-82.8)	16.8 (16.0-18.0)	42.0 (40.0-43.9)	36.5 (34.9-38.2)	0.87	-
51	*Pelagodroma marina albiclunis* Kermadec Is, skins[19]	1-4	ä	160.6 (155.0-166.0)	73.8 (72.6-76.3)	16.7	41.7 (41.0-42.3)	37.0 (35.2-38.0)	0.89	-
52		11	ä	155.0 (144.0-163.0)	70.1 (63.3-73.5)	16.3 (15.3-17.7)	40.8 (37.5-43.1)	37.0 (35.9-39.3)	0.91	-
53	*Pelagodroma marina hypoleuca* Canary Is and Madeira, skins[19]	3	ä	161.0 (153.0-170.0)	73.0 (72.7-79.0)	16.7 (16.2-17.7)	43.9 (42.3-44.8)	35.8 (35.2-36.7)	0.82	-
54		3	ä	153.3 (151.0-160.0)	70.1 (63.0-73.7)	17.0 (16.3-17.7)	43.2 (42.3-43.5)	35.7 (34.9-37.2)	0.83	-
55	*Pelagodroma marina eadesi* Cape Verde Is, skins[19]	20	ä	161.1 (151.0-170.0)	73.7 (68.0-79.5)	18.1 (17.4-19.5)	45.0 (43.0-47.5)	36.3 (34.3-38.4)	0.81	-
56		20	ä	157.8 (151.0-166.0)	71.4 (68.3-77.5)	18.0 (17.0-18.9)	44.4 (41.7-48.9)	36.0 (33.4-37.9)	0.81	-

ranked 2 and 3 (Table 1, data set 32 and 33, respectively), *O. oceanicus* ranked 5, 6, 7, 8, 10, 11, 12, and 13 out of 51 (Table 1, data set 12, 45, 15, 8, 10, 9, 11, and 13, respectively)). Therefore, these taxa are indistinguishable from the captured birds based on the measurements analysed (wing, bill, and tarsus lengths). However, all other taxa within *F. tropica, F. grallaria, N. fuliginosa, G. nereis*, and *Pelagodroma marina* were significantly different to both the captured birds and the NZSP museum specimens, falling outside of this grouping (having average distances >1). Additionally, *Pelagodroma marina, G. nereis*, and *O. gracilis* all fall out as distinct groups, not forming an overlap with any other taxa.

Unfortunately, the data is limited for several of the *O. o. oceanicus* studies, with no measurements for tail length, mid-toe + claw (therefore leaving mid-toe + claw/tarsus ratio undeterminable) (see Table 1). This led to a lack of resolution between the captured birds, the NZSP museum specimens, and taxa from *O. oceanicus*, and *F. grallaria*. To resolve this grouping we examined mean mid-toe + claw/tarsus ratio (from those taxa for which this could be determined) and 6 other plumage and structural characters (Table 2) (see Appendix 1). The comparison in Table 2 clearly resolves the lack of resolution suggested by Table 1, with the captured birds and the NZSP museum specimens sharing all 6 plumage and structural characters examined, but *O. oceanicus*, *F. tropica*, and *F. grallaria* differing in 3, 2, and 5 characters, respectively. Furthermore, the mean mid-toe + claw/tarsus ratio of the captured birds differed significantly to *F. tropica* and *F. grallaria*, and although still significantly different to that of *O. oceanicus*, this difference was less. The captured birds also differed significantly from the NZSP museum specimens, with the former being slightly larger, and this will be discussed later.

Appendix 1 contains a complete description of the plumage and structural characters of the captured birds, NZSP museum specimens, *O. oceanicus*, *F. tropica*, and *F. grallaria*. This comparison shows that in a number of other subtle ways, the captured birds and NZSP specimens are clearly different to the other taxa examined. The long narrow toes of NZSP agree more closely with *O. oceanicus*, as noted by Mathews (1932, 1933). There seems to be a gradation in the toes/claws of these taxa, from the flattened and short toes with relatively blunt, flattened, and almost rounded claws of *F. grallaria*, to rather less flattened and relatively

Table 1. Continued. [1] Murphy & Snyder 1952, [2] Bourne & Jouanin 2004, [3] Copestake & Croxall 1985, [4] Weimerskirch *et al.* 1989, [5] Jouventin *et al.* 1985, [6] Murphy 1918, [7] Roberts 1940 (corrected by Beck & Brown 1972), [8] Beck & Brown 1972, [9] Murphy 1933 (taken from Brooke 2004), [10] Harris 1969, [11] Beck & Brown 1971, [12] Warham & Bell 1979, [13] ABBBS, reported in Marchant & Higgins 1990, [14] Marchant & Higgins 1990, [15] Murphy 1928, [16] Fraser *et al.* 1988, [17] Murphy 1945, [18] Imber reported in Marchant & Higgins 1990, [19] Murphy & Irving 1951, [20] B. Stephenson, *unpubl.*

Table 2. [illegible] *O. oceanicus* [illegible] *F. tropica* and *F. grallaria.*

[illegible]	[illegible] birds	[illegible] specimens	*O. oceanicus*	*F. tropica*	*F. grallaria*
[illegible]	Y	Y	-	Y	Y
[illegible]	Y	Y	Y	Y	-
[illegible]	Y	Y	Y	-	-
[illegible]	Y	Y	-	Y	[illegible]
Pale bases to primary feathers	Y	Y	Y	-	-
[illegible] of outer rectrices	Y	Y	-	Y	-
[illegible] birds	-	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 0.03	[illegible] 0.02

[illegible] *F. g. grallaria* [illegible] *F. g. titan*

longer toes of *F. tropica* [illegible] *O. oceanicus.* [illegible] within [illegible] are substantial compared to those [illegible] *F. tropica* [illegible] both *O. oceanicus* and *O. gracilis* [illegible] spp. [illegible]

[illegible] like that of [illegible] *Oceanites* and *Garrodia.* [illegible] in *F. grallaria* [illegible] and *Oceanites* [illegible] of the captured birds with those of the other taxa again suggest that they are structurally more like [illegible] than *Oceanites* [illegible] opening directed upwards at a greater angle.

[illegible] photographs of wild birds.

[illegible] *O. oceanicus* [illegible] they generally appear to sweep across the surface [illegible] combination of these features sets them apart from [illegible]

[illegible] between *F. tropica* and *F. g. grallaria* is the colour of [illegible] *F. g. grallaria* has feathers [illegible] *O. oceanicus.* [illegible] *F. g. titan* shows that this taxon has pale windows to the dark [illegible] *F. tropica* [illegible] feathers of *F. tropica* [illegible]

Fig. 1. [illegible]

Table 3. [illegible]

[illegible]	[illegible] subspecies/number included in the analysis	[illegible] sampled in the analysis	[illegible] morphometric distance
[illegible] specimens combined	-	-	[illegible]
O. oceanicus	2 / 2	[illegible]	[illegible]
O. gracilis	2 / 2	3	[illegible]
F. tropica	2[a] / 1	[illegible]	[illegible]
F. grallaria	[illegible]	[illegible]	[illegible]
N. fuliginosa	0 / 1	1	[illegible]
G. nereis	0 / 1	[illegible]	[illegible]
Pelagodroma marina	[illegible]	[illegible]	[illegible]

[a] [illegible] *F. tropica melanoleuca* and its placement within *F. tropica*.

[illegible] *O. oceanicus*.

[illegible] *F. g. grallaria* is the concealed white bases to the outer [illegible] *F. tropica* [illegible] *F. g. grallaria* and *O. oceanicus* [illegible]

[illegible] be highlighted with reference to *O. oceanicus* and the [illegible] shows the outer webs of the median under primary [illegible]

Fig. 2. [illegible]

[illegible] and-white storm petrels.

[illegible] *F. grallaria* [illegible] *G. nereis* [illegible] less than all other taxa except for *O. oceanicus* and *G. nereis* [illegible] *F. grallaria* [illegible] morphology alone exist.

[illegible] taxa examined.

Feather Lice (Insecta: Phthiraptera)

[illegible]

Fig. 3. 3ÞÖ × ÏÖÚÖÚ ÚÏÖÞÐÕÎ ÛÏÌ ÚÙÙÌÈÒÌËÙÕÈÌÙ×ÈÙÚÙØÍ- 92/ ö+ÌÍÚÐÚ ! ıNKkY+ÈÕËÚÐÎ ÏÛÐÚ! ıNKkYk 3ÏÌÚÌ birds are considered moderately ÚÙÙÌÈÒÌËÚÐÕËÐÝÐËÜÈÓÚÙÞÐÛÏ ! ıNKkY+ ÏÈÝÐÕÎ ÚØÎÏÚà ÏÌÈÝÐÌÙ ÚÙÙÌÈÒÐÕÎ ö / ÏÖÚÖÚ Éà 1ÕÏÈÕ "ÓÈÙÒÌ ÈÕË 'ÈÓÌÔÈ)ÈÔÐÌÚÖÕÙÙÌÚ×ÌÈÚÐÝÌÓà.

ÔÈÓÌ ÈÕË l ÍÌÔÈÓÌÀ Þ ÌÙÌ ÐËÌÕÚÐ ı ÌË È ÈÚ *Philoceanus fasciatus* "ÈÙÙÐÒÌÙÙhJNkШAφ%ÐÎ ö KÅö

Age and breeding status of captured birds

ÓÕ K ÉÐÙËÚ ÏÈËÈ ËÔÞÔà ÈÙÖÕËÈ ×ÈÛÊÏ ÌÚÈÕË Þ ÌÙÌ ÚÊÔÙÌËÈ ÈÚ Y ! ıNKkYK ÏÈËÈ ÚÌÝÌÙÈÐ ÉÖËà ÍÌÈÙÌÌÙÚ ÈËÑÈÊÌÕÚ×ÛÖÙÛÏÌ ÉÙÖÖËÈ×ÈÛÊÌ ÙÜÚÙÌÙÜ×ÚÐÕÎÚÖÔ×ÐÕÚ ÉÜÚ ÛÏÐÚ ÔÈà ÏÉÝÌ ÚÐÔ×óà ÉÌÌÕ ËÜÌ ÚÖ ÛÏÌ ÉÖËà moult it was undergoing.

DISCUSSION

ÚÛÏÌ ÈÔÈÓàÚÐÚÈÉÖÝÌ ÏÈÚÚÏÖÞÕÚÏÈÚÛÏÌ ÊÈ×ÚÜÙÌËÈ ÉÐÙËÚÈÕËÈÛÏÌ - 92/ ÔÜÚÌÜÔÚ×ÌÊÐÔÌÕÚÙÌ×ÙÌÚÌÔÚ ÛÏÌ ÚÉÈÔÌÚÚ×ÌÊÐÌÚÚ ÞÌ ÕÖÞ ÚÙÌÍÌÙÚÖÚÛÏÌÔ ÉÖÜÏ ÈÚÚÛÏÌ - Ì Þ 9 ÌÈÓÈÒÈËÚÚÖÙÔ ı × ÌÚÙÌÓ - 92/ Å ö

Morphological analysis and comparison of NZSP with other extant storm petrels

3ÏÌ ÔÜÚÚÐÝÈÙÐÈÚÌ ÈÕÈÓàÚÐÚÚÛÏÌ ÖÞÚÛÏÌ ÈÙÚÛÏÌ KÚÊÈ×ÚÜÙÌËÈ ÉÐÙËÚÚ ÈÙÌÈ ÔÖÚÚÙ ÚÐÔÐÓÈÙÈ ÛÖÈ ÛÏÌ Ì Ł - 92/ ÔÜÚÌÜÔÚ ×ÌÊÐÔÌÕÚÙ*O. oceanicus* ÛÈÓËÈ*F. g. segethi* ÕÈ ÚÊÔÚÍÚ additional morphological data for many taxa meant ÛÏÈÙÈ ÛÏÐÚÈ ÎÙÖÜ×ÐÕÎÈ ÊÖÜÚÉÈ ÕÖÚÈ ÉÌÈ ÍÜÙÚÏÌÙÈ ÙÌÚÖÓÝÌËÈ using statistical analysis. It is not surprising that this grouping included *O. oceanicus* ÛÞÐÛÏÈ Þ ÏÐÊÏÈ - 92/ ÏÈÚÈÖÍÚÌÕÈÉÌÌÕÈÊÖÕÚÐËÌÙÌÈËÈÚÖÈÏÈÝÌÈÊÚÖÚÌÈÚÛÈßÕÕÖÔÐÊÈ ÙÌÓÈÛÐÖÕÚÏÐ×ÈÉÈÚÌËÈ ÖÕÈ ÔÖÜ×ÏÓÓÖÎàÈφ, ÜÙ×Ïà ÕÈ 2ÕàËÌÙÈ hJNklÁÈ ÉÌÐÕÎÈ ÝÈÛÐÕÜÚÓàÈ ÊÖÕÚÐËÌÙÌËÈ ÈÚÈ Î ÌÕÌÚÐÊÈÓÚàıÉÈÚÌËÈ ×ÚÜÔÈÎÌÈ ÝÈÛÐÈÕÚÈ ÕÍÈ *O. oceanicus* φ, ÜÙ×Ïà ÕÈ 2ÕàËÌÙÈ hJNklÁÈ ÖÙÈÚÈ ÈÌÁÈ ÛÌÈ ×ÈÙÈÌÈ Ú×ÌÊÐÌÚ *O. maorianus* φ. ÓÐÝÌÙÈ hJNkÁö ' ÖÞÌÝÌÙÈÛÏÌ ÈÕÊÚÜÛÐÕÖ of *F. g. segethi* ÞÚÈÔÖÜÌÈÖÍÈËÈÚÜÙ×ÙÐÚÌÙÈÊÚÌÈÙÓàÈËÜÌÈÖÈ ÛÏÌÈÚÐÔÐÓÈÙÐÙàÐÕÈÛÏÌÈÔÌÈÚÜÙÌÚÈßÈÔÐÕÌËÈφÞÐÕÎÙÉÐÓÓÈ ÈÕËÈÛÈÙÚÜÙÚÓÌÕÎÛÏÆÖÈ 3ÏÈÚÈ lÈ ÎÌÕÌÙÈ Þ ÌÙÌÈÚÏÖÞÐÕÈÛÈ ÉÌÈ ÔÖÜ×ÏÓÓÎÐÊÈÓÓàÈÐÕËÐÚÜÐÕÎÙÐÚÏÏÈÉÓÌÈÚÏÜÖÔÈ - 92/ÈÈ in the statistical analysis shows how similar these storm petrel species are with respect to morphology. ' ÖÞÌÝÌÙÐÛËÖÌÚÈÕÖÛÌÈÒÌÈÛÖÚÈÊÊÖÜÕÛÏÌÈÈËÐÛÐÖÊÓÈ ËÐř ÌÙÌÕÊÌÚÈÕÛÏÌÈÖËÈÚÜÙÜÙÌÈßÈÔÐÕÌËÈ ÐÕÈ3ÈÉÓÌÈlö

ÓÓÈ ÖÜÏ ÌÙÈ ÚÈßÈÈ ÌßÈÔÐÕÌËÈ ÐÕÈ ÛÏÌÈ ÈÕÉÓàÚÐÚÈ Þ ÌÙÌÈ ÚÐÎÐÞ ı ÊÈÕÚÙàÈËř ÌÙÌÕÚÈ Þ ÐÛÏÈÈÙÌÚ×ÌÊÚÈÚÈÛÔÖÙ×ÏÖÓÚÕÎàö 3ÏÐÚÈÊÖÕ ı ÙÔÚÈÛÏÌÈÚÈÛÏÌÈ - 92/ÈÐÚÈËÐÚÐÕÊÚÈÍÚÖÔÈÛÏÌÚÌÈ ÖÜÏ ÌÙÈÚÈßÈÙÈÕÈËÈÐÚÈÚÏÖÜÓÈËÌÈÕÓÚÌÈÚÖÔÈÓÚÓÈÖÚÏ ÌÙÈ *F. grallaria* ÚÜÉÚ×ÌÊÐÌÚÈφ*F. g. grallaria, F. g. titan, and F. g. leucogaster* ÅÕ "ÓÌÈÙÒàÈÛÏ ÌÙÌÈÙÌÈÖÜÏ ÌÙÈËÐř ÌÙÌÕÊÌÚÈ ÉÌÚÞÌÌÕÈ - 92/È ÈÕËÈ *Pelagodroma marina* ÛÉÜÚÈ ÛÏÐÚÈ ÚÈßÖÕÈ ÞÐÚÈÞÕÊÓÜËÈÌËÈ ÍÖÙÈÊÕÔ×ÓÌÙÌÕÌÚÚÈ ÈÕËÈ ËÜÌÈÛÔÈ ÚÐáÌÈÊÖÔ×ÈÙÐÚÖÕÚÈ ÔÈËÌÈ ÞÐÚÏÈÛÏÌÈÚÜÚ×ÌÊÚÌËÈ - 92/È ËÜÙÐÕÎÈ ÌÈÙÓàÈ ÇÌÖËÈ ÖÉÚÌÙÝÈÙÐÖÕÚß , ÖÙÌÖÝÌÙÈÛÏÌÈÚÌÈ results in general also support assertions that birds ÖÉÚÌÙÝÌËÈÐÕÛÏÌÈÇÌÖËÈÞÌÙÌÈÚÔÈÓÓÌÙÈÛÌÈÕÈÉÖÛÏÈ%*ÙÌÎÌÙÈ* Ú×ÌÊÐÌÚÈφ2ÈÝÐÓÓÌÈÌÙÈÓßÈ lÝÝ+Ûà &ÈÚÙÐÕà õ ! ÈÐÙËÈ lÝÝkÅö (ÕÛÌÙÌÚÚÐÔÓàÛÈÊÊÔÙËÐÕÎÛÖÛÏÌÈÕÈÓàÚÐÚÛÈ *Pelagodroma marina, G. nereis* ÛÈÕËÈ *O. gracilis* all fell out as ËÐÚÚÐÕÊÛÈ ÎÙÖÜ×ÚÈÐÕÈÎÛÏÌÈÔÖÜ×ÏÓÓÖÎÐÊÈÓÈàÚÐÚÈÕÖÛÈ ÖÝÌÚÓÈ××ÐÕÎÈ ÞÐÛÏÈ ÈÕàÈ ÕÛÏÌÈÚÈßÈÓÈ ÎÐÝÐÕÎÈ ÚÚÙÖÕÎÈ ÚÜ××ÔÙÛÍÖÙÛÏÌÈÐÙÈËÐÚÐÕÊÚÐÝÌÔÌÚÚö

Structural and plumage comparison of NZSP with other extant storm petrels

"ÖÔ×ÈÙÐÚÕÈÛÍÚÈËÈËÐÚÐÕÊÈÓÈ×ÓÜÔÈÎÌÈÕÈËÚÚÜÙÊÚÜÙÈÓÈ ÊÏÈÙÈÊÚÌÚÚÈ φ3ÈÉÓÌÈ lÁÈ ÌÔÈÉÓÌÈËÈ ÜÚÈ ÚÖÈ ËÌÔÕÕÚÚÙÈÓÌÈ the similarity between the captured birds and the - 92/ ÔÜÚÌÜÔÈ Ú×ÌÊÐÔÌÔÚÚÈ Þ ÏÐÚÚÈ ËÐř ÌÙÌÔÚÐÈÙÐÔÎÈ them from all taxa of *O. oceanicus, F. tropica* and

Fig. 4. 3ÞÖÐËÐřÌÙÌÕÛ - 92/ÚÐÖÐŘÐÎÏÛÛÚÏÖÞÐÕÎÛÏÌÐÜÕÖËÌÙ×ÈÙÛÚÐ ÐÛÊÖÌÖÐ&ÈÕÐlŸŸłAÐËÖËÐÜ××ÌÙ×ÈÙÛÚÐÛÊÖÌÕÐ+Ð)ÈÕÌÙlŸŸłAõÐ/ÏÖÛÖÚÉà!ÙÌÕÛ2ÛÌ×ÏÌÕÚÖÕõ

*F. grallaria*õÐ $ÝÌÕ *O. oceanicus* and *F. grallaria*ÛÐ ÖÍ which some taxa examined were indistinguishable ÉÈÚÌËÐ ÖÕÐ ÛÏÌÐ ÔÜÛÐÝÈÙÐÈÛÌÐ ÈÖÈÓàÚÐÚÐ ÐÚÌÌÐ ÈÉÖÝÌAÛÐ ÞÌÙÌÐÚÌ×ÈÙÈÛÌËÐÉàÐËÛÐÓÌÈÚÛÐÏÈÓÍÐÖÍÛÏÌÐ+ÐÊÏÈÙÈÊÛÌÙÚÐ examined. It is our opinion that had a complete ËÈÙÈÚÌÛÐÉÌÌÖÐËÝÈÐÓÈÉÓÌÐÍÖÙÛÏÌÐÔÜÛÐÝÈÙÐÈÛÌÐÈÖÈÓàÚÐÚÛÐ ÛÏÐÚÐ ÞÖÜÓËÐ×ÙÉÉÈÉÓàÐ ÏÈÝÌÐÌÓÐÔÐÖÈÛÌËÐÈÖàÐ*%ÙÎÎÌÙÈ* ÛÈßÈÐÍÛÖÔÛÛÏÌÐÌÛÙÖÜ×ÐÕÎõÐ ' ÖÞÌÝÌÙÛÐÜÏÌÐÔÌÈÖÐÔÐËı toe + claw/tarsus ratio for *O. oceanicus*ÐÎÓÓÐÝÌÙàÐÊÓÖÛÌÐ ÛÖÐ ÛÏÈÛÐ ÓÍÐ ÛÏÌÐ ÊÈ×ÛÜÙÌËÐ - 92/õÐ %ÜÙÛÏÌÙÛÔÖÙÌÙÐ ÛÏÌÐ ÚÐÎÕÐŗÊÈÖÛÐ ËÐřÌÙÌÕÊÌÐ ÉÌÛÞÌÌÕÐ ÛÏÌÐ ÊÈ×ÛÜÙÌËÐ ÉÐÙËÉÚÐ ÈÕËÐÛÏÌÐ - 92/ÐÔÜÚÌÙÛÔÐÚ×ÌÊÐÔÌÕÚÐÚÐÐ×ÌÙÏÈ×ÚÐÈÚÐÈÐ ÙÌÚÜÓÛÐÓÍÐÚÏÙÞÒÖÈÏÐÖÍÐÎÕÛÐÈÐÔÌÕÚÐÚÐÐ×ÌÙÏÈ×ÚÐÈÚÐÈÕËÐ ÑÐÎÏÛÐ×ÙÖÎÙÌÚÞÓÕÛÐ ÞÌÙÌÐ×ÈÙÛÞÊÜÓÈÙÓàÐÞÔ×ÓÜÛÈÕÚÐÐÕÐ this analysis.

3ÏÌÐ ÍÜÙÛÏÌÙÐ ÊÖÔ×ÈÙÞÚÕÕÐ ÓÍÐ ÛÏÌÐ ÊÏÈÙÈÊÛÌÙÚÐ ÌßÈÔÞÕÌËÐ ÐÕÐ ××ÌÕËÐßÐ hu ÚÏÖÞÌËÐ ËÈËÐÚÞÖÕÈÚÐ ËÐřÌÙÌÕÊÌÚÐÉÌÛÞÌÌÕÐÛÏÌÐÔÛÏÌÙÐÚÈßÈÐ ÌßÈÔÞÕÌËÐ3ÏÌÐÍÓÕÌÕÊÌÚÞÚÔÌÚÐÚÏÈ×ÌËÕËÐÚÜÙÛÊÚÜÙÛÐ ÓÍÐÛÏÌÐ ÉÞÓÐ ÈÕËÐ ÕÖÜÚÙÞÚÐÐ ÚÜÙÌÈÓÌËÐ ÜÖËÌÙ×ÈÙÚÐ ÈÕËÐ ŘÐÎÛÐ ×ÙÖÎÙÌÚÞÚÕÕÐ ÞÌÙÌÐ×ÈÙÛÞÊÜÓÈÙÓàÐÞÔ×ÓÜÛÈÕÚÐÐÕÐ this analysis.

3ÏÌÐ ÌßÈÔÞÕÈÛÞÚÕÕÐ ÓÍÐ ÚÜÙÛÔÐ ×ÌÜÙÌÓÐ Ú×ÌÊÐÔÌÕÚÐ ÈÛÐ ÛÏÌÐ , ÜÚÌÜÛÐÜÍÐ - ÌÞÐ9ÌÉÚÈÕËÐ3Ì/È×ÈÐ3ÕÕÎÌÈÙÌÞÈÚÐ ÜËÊÓÓÈÕËÐ (ÕÚÛÞÚÜÜÌÐ ÈÕËÐ , ÜÚÌÜÛÔÐ ÈÕËÐ ÛÏÌÐ ! ÙÞÚÞÚÏÐ - ÈÚÜÙÈÓÐ ' ÐÚÜÔÐÙà , ÜÚÌÜÛÔÐ ÚÏÖÞÚÐ È Ì ÛÌÈÚÐ ËÌÈÓÐ ÓÍÐ ÝÈÙÞÉÉÓÞÚÛÐÙà ÌßÞÚÚÚÐÕÛÏÌ×ÈÇÙÌÜÕÐÕÎÚÍÛÏÌÐÉÚÐÐ×ÈÇÙÌÜÕÐÔÎÐ belly of *F. tropica*ÛÉÚÛÐÕÛÉÞÚËÐÚÍÖÞÌËÐ×ÈÇÙÌÜÕÐÔÎÐ

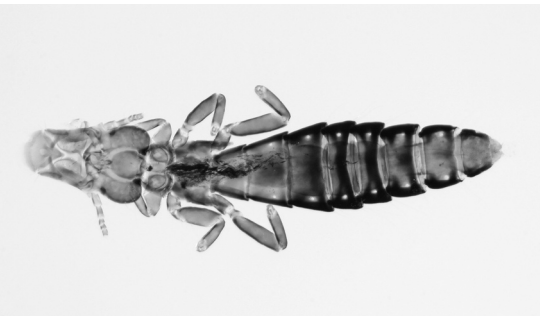

Fig. 5. , ÈÓÌÐ *Philoceanus fasciatus*Ðφ"ÈÙÜÞÒÌÙÚÐhyNkШAÐÊÖÓÓÌÊÛÌËÐ ÍÜÖÔÐ!ıNXλhvkÐÈÚÐ6ÈÐÔÈÖÔÈÓÐ!Èà+ÐQÚÎÐ!ÈÙÜÞÌÙÐ(ÚÐK - ÖÝÐ lŸŸKÐÉà1ÐÊÏÈÙËÐ&ÜÞŚÛÏÚõ/ÏÖÜÕÐÉà)ÌÈÓı"ÓÈÜËÌÐ2ÛÈÏÓõ

ÙÌÔÖÛÌÓàÐÚÐÔÐÓÈÙÐÛÖÐÛÏÌÐÚÛÙÌÈÒÞÕÎÐÚÌÌÕÐÕ - 92/õÐ3ÏÌÐ only truly streaked *F. tropica* collected to date is the 2ÈÔÖÈÕÚ×ÌÊÐÔÌÕÐÓÍÐ*Thalissidroma lineata*φ/ÌÈÓÌhvШKШÛ , ÜÚ×ÏàÐõÐ2ÕàËÌÙhyNklAõÐ2ÐÔÓÈÙÓàÚÛÏÌÙÌÐÈÙÌÐÈÓÔÖÚÛ no records of *F. grallaria* showing similar streaked ÜÕËÌÙ×ÈÙÛÚÐ ÌßÊÌ×Û ÍÔÙÐ ÛÏÌÐ , ÈÙØÜÌÚÈÕÐ Ú×ÌÊÐÔÌÕÐ φ , ÜÚ×ÏàÐ hyNlkÛ , ÜÚ×ÏàÐ õÐ 2ÕàËÌÙÐ hyNklAõÐ $ÝÌÕÐ ÐÔÚÌÙÔÌËÐÈÚÌÐ ÖÙÐ ËÈÙÖÐ ÔÖÚ×ÏÐ ÕÊËÐÝÐËÜÈÚÓÚÐ ÌÝÐËÌÕÚÐ in some populations of *F. g. grallaria*Ðφ+ÖÙËÐ ' ÖÞÌÐ ÈÖËÐ *ÌÙÔÈËÌÊÐ(ÚÓÈÕËÚÆÐÈÙÌÐÕÖÚÐÚÛÙÌÈÒÌËÐÉÜÙÐÚÏÖÞÐ gradual darkening of the plumage in the axillaries ÈÖËÐ ŘÈÕÒÚÛÐ ÞÐÛÏÐÛÏÌÐÉÌÓÓàÐÙÌÔÈÐÕÐÔÎÐ ×ÈÓÌÐÐÕÐ ÈÓÓÐ ÉÜÚÐÛÏÌÐËÈÙÒÌÚÛÐÐÕËÐÝÐËÜÈÓÚÛÐφ, ÈÙÊÌÈÖÚÐõÐ ' ÐÎÎÐÕÛÐ hyNNYÛÐ *pers. obs*õÆÐ . ÊÊÈÚÐÕÖÈÓÐ ÈÉÌÙÜÈÕÛÓàÐ ×ÓÜÔÈÎÌËÐ *O. oceanicus*Ð ÏÈÝÌÐ ÉÌÌÕÐ ÙÌÊÖÜËÌËÐφ, ÜÚ×ÏàÐhyNhvШÛÐ , ÜÚ×ÏàÐõÐ2ÕàËÌÙÐhyNkÛÐ . ÓÞÝÌÙÐhyNkkÛÐ3ÙÐÔÉÓÌÐhyNHШÛÐ !ÖÜÙÕÌÐhyNШXÛÐ"ÜÙÛÞÚÐhyNШШAõÐ ' ÖÞÌÝÌÙÚÐÛÏÌÙÏÌÐÝÌÐÕÖÛÐ ÚÏÖÞÕÐÚÛÙÌÈÒÞÕÎÐÚÖÕÐÛÏÌÐÊÝÌÐÕÖÛÐ ÈÕËÐÛÏÌÐ - 92/ÐÔÜÚÌÙÛÔÐÚ×ÌÊÐÔÌÕÚÐÚÐÐ×ÌÙÏÈ×ÚÐÈÚÐÈÕËÐ ÙÌÚÜÓÛÐÓÍÐÚÏÙÞÒÖÈÏÐÖÍÐÎÕÛÐÈÐÔÌÕÚÐÚÐÐ×ÌÙÏÈ×ÚÐÈÚÐÈÕËÐ storm petrel that shows similar prominent streaking ÙÖÐÛÏÌÐÚÛÍÖÜÖÈÐÔÛÏÌÐ - 92/õ

Morphological variation currently accepted within other storm petrel species

3ÏÌÐÚÛÈÙÐÚÐÊÈÚÐÈÕÈÓàÙÐÚÐÖÍÐÔÖÜ×ÏÖÓÖÎÐÊÈÓÚÐÝÈÙÐÈÙÐÖÕÐ within accepted storm petrel species showed ÛÏÈÛÐÝÈÙÐÈÙÐÖÕÐÍÖÜÖËÐÞÐÛÏÐÕÐÛÏÌÐ - 92/ÐφÐÕÊÓÜËÐÕÎÐ captured birds and museum specimens) to be less than that found within both species of *%ÙÎÎÌÙÈ*ÛÐ*N. fuliginosa*ÛÐ*O. gracilis*ÛÐÈÕËÐ*Pelagodroma marina*õÐ . ÕÓàÐ *O. oceanicus* and *G. nereis*Ð ÚÏÖÞÏËÐ ÔÌÚÚÐ ÝÈÙÐÈÙÐÖÕÐ "ÔÌÈÙÓàÐÛÏÌÐÝÈÙÐÈÙÐÖÕÐÍÖÜÖËÐÞÐÛÏÐÕÐÛÈÕËÐÉÌÙÞÌÌÕÐÛÏÌÐ ÊÈ×ÜÜÙÌËÐÉÐÙËÚÐÈÕËÐÛÏÌÐ - 92/ÐÔÜÚÌÙÔÐÚ×ÌÊÐÔÌÕÚÐÚÐ within the limits of currently accepted storm petrel Ú×ÌÊÐÌÚÐÈÕËÐÕÐÔÈÕàÐÊÈÚÌÚÐÖÜËÏÐÌÚÚÛ

(ÛÐÚÐÞÕÛÌÙÌÚÐÕÎÐÛÏÈÚÐ ÞÌÐÍÖÜÖËÐÈÐÙÌÓÈÛÐÝÌÓàÐÓÖÞÐ ÈÔÖÜÖÛÐÚÍÐÝÈÙÐÈÛÐÖÕÐÚÐ*O. oceanicus*ÛÐÈÚÐÚÐÛÐÚÎÌÕÌÙÈÓÓàÐ considered that this species has 2 distinct sub- Ú×ÌÊÐÌÚÐÉÚÜÐ ÖÜÚÐÙÌÚÜÚÛÐÚÜÙÎÌÚÐÛÏÈÚÐÛÏÐÚÐ ÔÊÐÕÈÚÐÈÕËÐÙÌÔÈÛÌÈÐÛÖÐÓÈÛÐÚÜÙÈÌÐÙÌÛÏÈÕÐÛÖÐÈÊÛÜÈÚÐ ÚÌ×ÈÙÈÉÓÌÐÚÜÉı×ÚÌÊÐŗÊÐËřÌÙÌÕÊÌÚÐÞÐÛÏÌÙÐÚÌÌÐ!ÙÖÕÕÌÐÙÇŸŸKÅõÐ *G. nereis*ÐÚÐÎÌÕÌÙÈÓÓàÐÊÕÕÚÐÈÙÌÙÌËÐÛÖÐÉÌÐÔÖÕÕÚà×ÐÊÚÐ

[illegible] found within *F. grallaria* would suggest this species [illegible] higher than that found within any other storm petrel [illegible] *F. g. titan* [illegible] within the *F. grallaria* complex.

Feather Lice (Insecta: Phthiraptera)

[illegible] *Philoceanus fasciatus* [illegible] genus *Philoceanus* [illegible] *et al.* 2003). *Philoceanus fasciatus* [illegible] recorded from both *F. tropica* and *F. grallaria* and is [illegible] *Philoceanus robertsi* [illegible] *O. oceanicus*) and *Philoceanus garrodiae* [illegible] *G. nereis* [illegible]

[illegible] *et al.* [illegible] *et al.* [illegible] and the louse *Philoceanus fasciatus* was regarded as [illegible] to [illegible] than to either *Oceanites* or *Garrodia*.

Age and breeding status of the captured birds

[illegible] pre-breeding storm petrels captured near breeding [illegible] *et al.* [illegible] begin denuding about a month before egg-laying [illegible] *O. castro* [illegible] petrel *Hydrobates pelagicus* [illegible] *F. tropica* [illegible] *O. oceanicus* 30- [illegible] *O. castro* [illegible] *O. oceanicus* [illegible] *H. pelagicus* [illegible] the 3 birds captured in Jan did not show any sign of [illegible]

An unravelling taxonomy

[illegible] *O. oceanicus* [illegible] *Pealea* [illegible] *O. oceanicus.* [illegible] between these [illegible] spp. and links to *Pealeornis* is warranted.

ACKNOWLEDGEMENTS

[illegible] running the statistical analyses in this paper and for [illegible]

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[illegible] *Pelagodroma*). *American Museum Novitates 1506* [illegible]

[illegible] *Pealea* [illegible] and other notes on storm petrels. *American Museum Novitates 1596* [illegible]

[illegible] *Hydrobates pelagicus* prospecting potential breeding colonies. *Ringing and Migration 22* [illegible]

[illegible] *New Zealand birds* [illegible]

[illegible] *New Zealand birds.* 2nd [illegible]

[illegible] *Albatrosses, petrels, and shearwaters of the World* [illegible]

[illegible] *Checklist of the Birds of New Zealand and the Ross Dependency, Antarctica* [illegible]

[illegible] *Molecular Phylogenetics and Evolution 30* [illegible]

[illegible] analyses. *Systematic Biology 49* [illegible]

[illegible] *United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842. Under the command of Charles Wilkes USN* [illegible]

[illegible] *Oceanites oceanicus* [illegible] *Notornis 48* [illegible]

[illegible] *World checklist of chewing lice with host associations and keys to families and genera* [illegible] *In*: [illegible] *The chewing lice: world checklist and biological overview*. [illegible]

[illegible] *Notornis 26* [illegible]

1 Ð Ë Î Þ È à Ú 1 õ hУ Ш Ш Ł õ # Ì Ú Ê Ù Ð × Û Ð Ö Õ Ö Ï Ú È Ö Õ Ì Þ Î Ì Õ Ü Ú Ö Ï Ú . Ê Ì È Õ Ð Û Ð Ë È Ì õ *Auk 3* Ö Ł Ł Kõ

1 Õ É Ì Ù Ù Ú Ö ! õ ! õ hУ N K Ў Ö 3 Ï Ì Ö Ð Ì Ö Ê à Ê Ó Ì Ö Ï Ú Ö Ï Ì Ö 6 Ð Ó Ú Õ Õ ? Ú Ö × Ì Ù Ù Ì Ó *Oceanites oceanicus* Ö * Ü Ï Ó Ł õ *British Graham Land $ß×ÌËÐÛÐÖÕhУNŁKıŁλ2ÊÐÌÕÛÐ ƒÊ 1 Ì*×Ö Ù Ú *1* ÓhuKhuıhУNKõ

2 È Ý Ð Ó Ó Ì Ó 2 õ Ö 2 Û Ì × Ï Ì Õ Ú Ö Õ Ö ! õ Ö 2 Ö Ü Ù Ï Ì à Ú (õ Ö l Ў Ў Ł õ Ö × Õ Ú Ú Ð É Ó Ì Ö Ú Ð Î Ö Ð Õ Î Ö Õ Í Ö È Õ ş Ì ß Ú Ð Õ Ê Û ? Ö Ú É Ð Ù Ë Ö Ł Ö Ù Ï Ì Ö - Ì Þ 9 Ì È Ó È Õ È Ö Ú Ù Ë Ö Ù Ï Ì Ö petrel. *Birding World 16*ÓhuλŁıhuλkõ

2 Ï Ð Ù Ð Ï È Ð Ú ' õ l Ў Ў l õ *The complete guide to Antarctic wildlife.* - Ì Þ Ö) Ì Ù Ú Ì à Ú / Ù Ð Õ Ê Ì Ù Õ Õ Ö 4 Õ Ð Ý Ì Ù Ú Ð Û à Ö / Ù Ì Ú Ú õ

2 Ï Ð Ù Ð Ï È Ð Ú ' õ l Ў Ў λ õ *A complete guide to Antarctic wildlife.* 2 Ì Ë Õ Õ Ë Ö $ Ë Ð Û Ð Õ Õ Ú +Ö Õ Ë Ö Õ Ú Ö õ Ö " Ö ! Ó Ë Ê Ò õ

2 Û Ì × Ï Ì Õ Ú Õ Ö Ú ! õ , õ Õ Ú % Ó Ö Ö Ë Ú Ú 1 õ Ö 3 Ï Ö Õ Ê Ú Ú Ú ! õ Ö 2 È Ý Ð Ó Ó Ì Ú 2 õ Ö l Ў Ш õ Ú 1 Ì Ë Ð Û Ê Õ Ý Ì Ù à Ú Õ Í Ú Ù Ï Ì Ö - Ì Þ 9 Ì È Ó È Õ Ë Ö Ú Ù Ù Ô ı × Ì Ù Ù Ì Ó *Pealeornis maoriana* Ö , È Ù Ï Ì Þ Ú hУ N Ł l Á ó Ú Þ Ö Ö Ú Ð Î Ï Ù Ð Õ Î Ú Ö Ú Ï È Ù Ö Ù Ì Ý Ð Ú Ì È Ö Ë Ö Ú Ù Ö knowledge of storm petrels. *Notornis 55*ÓλλıШŁõ

3 Ù Ð Ô É Ó Ì Ú ! õ hУ N Ł Ш õ É Ì Ù Ù È Ò Ú Ö 6 Ð Ó Ú Õ Õ ? Ú Ö × Ì Ù Ù Ì Ó Ö Õ Ö Û Ï Ì Ö - Ì Þ Í Ö Ü Õ Ë Ó È Õ Ë Ö & Ù È Õ Ë Ö ! È Õ Ò Ù Ú õ *Auk* Ш Ł kóuhuŁЎ õ

3 Ð Ô Ô Ì Ù Ô È Õ Õ Ú Ö & õ hУ N Ł hu õ Ö & Ù Ü × × Ì Õ ı 1 Ì Ý Ð Ú Ð Ö Õ Ì Õ Ö É Ì Ð Ö , È Ó Ó Õ × Ï È Î Ì Õ õ Ö (((õ Ö & Ì Õ Ü Ú Ö *Philoceanus* Ö * Ì Ó Ó Õ Î Ô Ú hУ NЎ Ł õ *Zeitschrift für Parasitenkunde 20*ÓkllkıkŁλõ

5 Ì Ù Ï Ì à Ê Ì Õ Ú " õ Ú) Ö Ü Ý Ì Õ Ð Õ Ú / õ Ú hУ N Ж õ Ú . Ó Í È Ê Ù Ö Ù à Ö É Ì Ï È Ý Ð Ö Ù Ö Í Ö foraging Procellariiformes. *Auk 111*Ó Ö l Ш k ı l Ж hu õ

6 È Ù Ï È Ô Ú) õ Ú hУ N Ж Ў õ Ö *The petrels: their ecology and breeding systems*õ Ö + Õ Õ Ë Ö Õ Ú Ö Ê È Ì Ô Ð Ê ı / Ù Ì Ú Ú õ

6 È Ù Ï È Ô Ú) õ Ú ! Ì Ó Ó Ú ! õ # õ Ú hУ N Ж N õ Ú 3 Ï Ì Ö É Ð Ù Ë Ú Ö Ú Í Ö Õ Ú Ð × Ö Ë Ì Ú Ö (Ú Ó Ê Ö Ë Ú Ö - Ì Þ 9 Ì È Ó È Õ Ë Ö Ú *Notornis 26*ÓhulhuıhuŁNõ

6 Ì Ð Ô Ì Ù Ú Ó Ð Ù Ê Ï Ú Ö ' õ Ö Ú 9 Ö Ú Ð Ì Ù Ú Ö 1 õ Ö) Ö Ü Ý Ì Ô Ú Ð Õ Ú / õ Ú hУ N Ш Ж õ Ö 3 Ï Ì Ö È Ý Ð Í È Ü Õ È Ö Ú Í Ö Ù Ï Ì Ö * Ì Ù Î Ü Ì Ó Ì Ô Ö (Ú Ó È Õ Ê Ú Ö Ú *Emu 89*ÓhukılЖõ

6 Ð Ó Ò Ì Ú Ú Ö " õ Ú hУ Ш Ł k õ Ö *Narrative of the United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842*õ Ö 6 Ð Ù Ï Ö Ð Ó Ú Ü Ú Ù È Ú Ð Õ Õ Ú Ö È Õ Ë Ö Ö È × Ú õ Ö (Õ Ö ? Ý Ì Ö Ý Õ Ó Ú Ü Ô Ì Ú õ Ö / Ï Ð Ó È Ë Ì Ó × Ï Ð È Ò Ö + Ì È Ö È Õ Ë Ö ! Ó Ê Õ Ê Ï È Ù Ë õ

9 Ð Õ Ò Ú 1 õ , õ Ú $ Ó Ë Ù Ð Ë Î Ì Ù) õ + õ Ö hУ N Ш Ў õ Ö 6 Ï à Ö Ë Ö Ì Ú Ö Ú Ï Ì Ö 6 Ð Ó Ú Õ Õ ? Ú Ö × Ì Ù Ù Ì Ó Ï Ý Ì Ö à Ì Ó Ó Ð Ö Õ Ö Ú Ï Ì Ö Þ Ì É Ú Ö Ó Ö Í Ö Ð Ú Ú Ö Í Ì Ì Ù ÿ Ö *British Birds 73*ÓŁШkıŁШλõ

Appendix 1. [illegible] *F. g. grallaria* [illegible] *F. grallaria* [illegible]

	[illegible]	- 92/	*O. oceanicus*	*F. tropica*	*F. g. grallaria*
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]					
[illegible]	[illegible] depth distinct being just forward [illegible] increasing into slightly bulbous [illegible] with sharply hooked tip	[illegible] depth distinct being just forward [illegible] increasing into slightly bulbous [illegible] means mandibular unguis not as [illegible]	[illegible] lower edge of ramicorn fairly straight [illegible] sharply hooked tip	[illegible] distinct being just forward of where [illegible] into slightly bulbous maxillary and [illegible] hooked tip	[illegible] mandibular unguis bulbous and [illegible] joins culminicorn
[illegible]	[illegible] to touch	[illegible] of nostril more pronounced than in other extant *Oceanites* and [illegible]	[illegible] septum does not reach opening [3]	[illegible] length [illegible] septum unknown	[illegible] does not reach opening [3]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] suggestion the feet and webs of the Paris specimens were painted black [1]	[illegible] in specimens	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] point closer to tip than base [illegible] as long as wide	[illegible]	[illegible] when worn [3]
Plumage					
[illegible]	[illegible]	[illegible]	[illegible] often show white loral patch [2]	[illegible]	[illegible]
[illegible]	[illegible] unless feathers parted or worn	[illegible] as apparent in the Paris specimens	[illegible] predominantly blackish brown with dark grey bases	[illegible] with a white central window on each [illegible] extending between the base and tip along the rachis	[illegible] predominantly black/blackish brown [illegible] *F. g. titan* [illegible] to *F. tropica*

Appendix 1. [illegible]

[illegible]	[illegible] when fresh) which also make this area show as a pale carpal bar	[illegible] open wing to examine fully	[illegible] paler greyish or greyish brown greater [illegible] carpal bar across innerwing [3]	[illegible] inconspicuous grey-brown bar from carpal to base of wing at rear [3]	[illegible] appearing as pale wingbar on innerwing becoming paler with [illegible] upperwing in fresh plumage has frosted appearance from pale fringes [illegible] [3]
[illegible]	[illegible] outer webs and white inner webs [illegible] of underwing in photos of birds in [illegible] white median and greater underwing [illegible] edge of armpit blackish brown	[illegible] dark outer webs to the median under [illegible] pale edges	[illegible] [3]	[illegible] and white outer and inner webs to [illegible] median and axillaries white [3]	[illegible] median under primary and lesser [illegible] on outer web and white on inner [illegible] thus forming white triangular patch in underwing
[illegible] primaries	[illegible]	[illegible]	[illegible] blackish brown feathers [illegible] examination of museum specimens shows dark bases	[illegible] concealed pale base	[illegible] concealed pale base
[illegible]	[illegible] predominantly blackish brown with some white and pied feathers [illegible]	[illegible]	[illegible] [3]	[illegible] [3]	[illegible] in dark morph where only lateral feathers are pale [3]
[illegible]	[illegible] due to feathers with dark shafts and [illegible] dark upper- and white lower-breast not [illegible] projecting into the white belly	[illegible] lower-breast and belly white and [illegible] immaculate white near the midline [illegible]	[illegible] white extending from lower rump [illegible] the feathers of the belly [2]	[illegible] contrasting with white lower-breast/ [illegible] brown line running down centre [illegible] between island populations)	[illegible] brown upper breast with sharp demarcation to white lower breast/ [illegible] has increasing amount of dark brown [illegible] brown underparts except smudgy [illegible] like *F. tropica*

Appendix 1. [illegible]

[illegible]	[illegible] rectrix narrow	[illegible]	[illegible] concealed white bases extending [illegible] narrow	[illegible] and outer webs of outer rectrices [illegible] more prominent extending almost [illegible] rectrix narrow	[illegible] and paddle shaped
[illegible]	Predominantly black/blackish brown [illegible] white tips to the dark lateral greater [illegible] birds photographed at sea	Predominantly black/blackish [illegible] fringing	[illegible]	[illegible] narrowly fringed with white[3]	[illegible] dark morphs are predominantly dark in this area[3]
[illegible]	[illegible] becoming more rounded when [illegible] to slightly rounded when spread. [illegible]	[illegible] and wing shape from specimens. [illegible] past tail	[illegible] forked [illegible]	[illegible]	[illegible] *F. tropica.* [illegible] spread [illegible]
[illegible] progression and jizz	[illegible] abrupt changes of direction		[illegible] with rapid wing-beats interspersed [illegible] and jump on surface with wings [illegible][3]	[illegible] wings sometimes held in only shallow dihedral[3]	[illegible] *F. tropica*[illegible]

[1] [illegible]